MIL-F-24385(NAVY)
AMENDMENT-8
20 June 1974
SUPERSEDING
Amendment-7
24 July 1973

MILITARY SPECIFICATION

FIRE EXTINGUISHING AGENT, AQUEOUS

FILM FORMING FOAM (AFFF) LIQUID

CONCENTRATE, SIX PERCENT, FOR

FRESH AND SEA WATER

This amendment forms a part of Military Specification MIL-F-24385(NAVY), 21 November 1969, and is approved for use by interested commands of the Department of the Navy and the Marine Corps and is available for use by all Departments and Agencies of the Department of Defense.

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2.1: Delete reference to Federal Specifications "PPP-D-700, PPP-D-729, PPP-D-1152 and PPP-P-704" and add the following Federal Specifications:

"RR-S-366 - Sieve, Test.
"VV-G-76 - Gasoline, Automotive.
"PPP-C-1337 - Containers, Metal, With Polyethylene Inserts."

2.1: Add the following Military Specification:

"MIL-F-22287 - Fire Extinguishing Agent, Potassium Dry Chemical."

2.2: Add the following ASTM Standard:

"ASTM D1821-63 (1969) - Inorganic Chlorides in Askarels, Test for."

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2.2: Add the following:

"DEPARTMENT OF TRANSPORTATION
"49 CFR171-1790 - Department of Transportation Rules and Regulations for Transportation of Explosives and Other Dangerous Articles.

"(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C, 20402.)"

2.2 Under UNIFORM CLASSIFICATION COMMITTEE, delete parenthetical paragraph and substitute:

"(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)"

1/ THE MARGINS OF THIS AMENDMENT ARE MARKED "#" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

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3.3: Delete and substitute:

"3.3 Compatibility. The concentrate of one manufacturer shall be compatible with the concentrate furnished by the other manufacturers listed on the qualified products list for this specification. An admixture shall conform to the following:

Requirement	Paragraph
Viscosity	3.5
Foamability	3.9
Film formation and sealability	3.10
Twenty-eight square-foot test	3.11.1
Stability	3.13

The percentages of the components in the admixture shall be determined by the testing activity. The material shall also be compatible with all materials in inventory. Information on the materials in inventory can be obtained upon request from the Naval Ship Engineering Center, Hyattsville, Maryland 20782.

3.5: Delete and substitute:

"3.5 Viscosity. The concentrate shall have a maximum kinematic viscosity of 80 centistokes (cs) at 40° ± 0.1°F, when tested as specified in 4.7.2. An admixture, in proportions specified for compatibility testing, shall not show a viscosity greater than the more viscous of the constituents."

3.6: Delete and substitute:

"3.6 pH value. The concentrate shall have a pH value between 7.0 and 8.5 at 77° ± 1°F, when tested as specified in 4.7.3. Samples tested subsequent to qualification shall deviate not more than 0.5 from the pH value determined during qualification testing, but in no case shall be less than 7.0 or greater than 8.5 at 77° ± 1°F."

3.9, line 3: Delete "3 minutes minimum value" and substitute "2.5 minutes minimum value".

3.11.1: Delete and substitute:

"3.11.1 Twenty-eight square-foot test. When tested for fire performance as specified in 4.7.8, the fire shall be completely extinguished with an application density of 0.08 gal/ft^2 (65-second application time) or less, and shall exhibit a 25 percent burnback time of at least 4.0 minutes (240 seconds)."

3.11.2: Delete and substitute:

"3.11.2 Fifty-square-foot fire test. When tested for fire performance as specified in 4.7.9, at least 85 percent of the fire shall be extinguished within 40 seconds and the summation of the "percent of fire extinguished" values recorded at 10, 20, 30, and 40 seconds shall be a minimum of 225. The burnback time shall be at least 4.0 minutes (240 seconds)."

3.12, line 2: Delete "0.5 mdd for 6061T6 aluminum alloy".

Add new paragraph 3.12.1:

"3.12.1 Localized corrosion. When tested as specified in 4.7.11.1, none of the specimens of corrosion resistant steel (CRES 304) shall be pitted to an extent that is visible at a magnification of 10X."

3.13: Delete and substitute:

"3.13 Stability. The concentrate and solution in fresh water shall be tested as specified in 4.7.12. At the end of the required storage period, the concentrate samples shall show no evidence of stratification. Any precipitate, if present, shall not exceed 1 percent by volume. The diluted solution samples shall show no evidence of stratification

and precipitate formation shall not exceed 1 percent by volume. In addition, stored samples shall conform to the limits specified herein where tested as specified in 4.7.1, 4.7.5, 4.7.6, and 4.7.7, except that foam expansion shall be not less than 6.0 (after storage) and the 25-percent drainage time shall be not less than 2.5 minutes (after storage)."

Add new paragraphs 3.15 and 3.16:

"3.15 Chloride content. The concentrate shall contain not more than 100 parts per millions (ppm) of chloride ion when tested in accordance with ASTM D1821-63 with modifications as specified in 4.7.13.

"3.16 Potassium dry chemical compatibility. When tested as specified in 4.7.14, the fire performance shall conform to all the requirements of 3.11.1 (65 sec extinguishing time and 240 sec burnback time)."

4.3.1, line 1: Delete "Five" and substitute "Twenty".

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Table I: Delete the listings for the last four tests and substitute the following: Delete footnote 1 at the end of the table.

Reference	Title	Qualification	Quality conformance	Production check 2/
3.11.2, 4.7.9	Fire performance (50 sq. ft.)		X	
3.11.3, 4.7.10	Fire performance (1260 sq. ft.)	X		
3.12, 4.7.11	Corrosion	X		
3.13, 4.7.12	Stability	X		
3.15, 4.7.13	Chloride content	X	X	
3.16, 4.7.14	Potassium dry chemical compatibility	X		

4.5.2, lines 1 and 2: Between "selected" and "in" insert "from each lot".

4.5.4: In line 2, delete "four additional 5-gallon containers" and substitute "one additional 5-gallon container", and at the end of the paragraph add "If the same lot is being offered on more than one contract, one sample will suffice."

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4.7.6, line 4: Delete "approximately 10 feet" and substitute "4 to 6 feet".

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4.7.8.4.2, lines 5 and 6: Delete "and shall always maintain the nozzle in the same attitude".

4.7.8.4.3: Delete and substitute:

"4.7.8.4.3 Burnback. The burnback test shall start within 60 seconds after the 90-second solution application. A weighted 1-foot diameter pan having 2-inch side walls and charged with 1 quart of gasoline shall be placed in the center of the area. (An eyebolt with an 8-inch shaft attached to the center of the pan and a 10-foot pole with a hook on the end will facilitate the placement of the pan.) The fuel in the pan shall be ignited just prior to placement. Burnback time shall commence at the time of this ignition and terminate when 25 percent of the fuel area (7 square feet), (36-inch diameter), originally covered with foam is aflame. After the large test pan area will sustain burning, the small pan shall be removed.

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NOTE: Intermittent "flash-overs" occur occasionally and are characterized by creeping blue flames consuming the uppermost layer of the foam blanket. They usually self-extinguish. They shall not be considered part of the burnback area unless sustained burning occurs. However, "flicker-fires" which are characterized as a series of sustained scattered fires burning freely above the foam blanket shall be judged independently and their cumulative areas used to determine 25 percent burnback time."

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4.7.9 thru 4.7.9.5: Delete and substitute:

"4.7.9 Fire performance (50-square-foot test).

"4.7.9.1 Test site. The fire test shall be conducted in a level circular area 8 feet in diameter (50-square-feet). The base and surrounding dike shall be a material suitable for the containment of fuel on a substrate of water. The water depth shall be the minimum required to ensure complete coverage of the diked area with fuel.

"4.7.9.2 Test equipment. The nozzle used for applying the agent shall be the 2 gpm device described in 4.7.8.2 operated at 100 psi (application rate 0.04 gpm per square foot).

"4.7.9.3 Test materials. The solution used shall be sea water at 70° ± 10°F containing 6.0 ± 0.1 percent by volume of AFFF concentrate. The fuel shall be 10 gallons of gasoline conforming to MIL-G-5572 or VV-G-76.

"4.7.9.4 Test procedure. One fire test is required for each quality conformance test. Tests shall not be conducted when wind speeds are in excess of 10 miles per hour. The entire fuel charge shall be dumped into the diked area as rapidly as possible. Before fueling all extinguishing agent from previous runs shall be removed from the diked area. The fuel shall be ignited within 60 seconds of dumping and shall be permitted to burn freely for 10 seconds before starting agent application.

"4.7.9.4.1 The fire shall be extinguished as rapidly as possible and in the most effective and expeditious manner. The nozzle shall be moved slowly from side to side to permit the foam pattern to fall from edge to edge of the fire. The operator shall move forward and around the area as the fire front recedes. Foam shall be applied continuously for 90 seconds to provide a constant cover for the burnback test. The fire shall be completely extinguished within the 90 second application.

"4.7.9.4.2 One run each in fresh water and sea water of the 50-square-foot fire performance test shall be required for qualification. One run each in sea water only will be required for quality conformance and production check tests.

"4.7.9.5 Burnback. At the conclusion of the extinguishing portion of the fire test, a burnback test shall be conducted as described in 4.7.8.4.3, except that the 25-percent area shall be 12.5 square feet (4 feet in diameter)."

4.7.10.3, line 2: Delete "250 gallons" and substitute "300 gallons".

4.7.10.4.1, line 1: Delete "60 seconds" and substitute "2 minutes".

4.7.10.4.3: Delete and substitute:

"4.7.10.4.3 A minimum of two runs with sea water and one with fresh water of the 1260-square foot fire performance test shall be required for qualification. Additional fire tests shall be conducted in cases considered marginal by the testing activity."

4.7.11, line 2: Delete "6061T6 aluminum alloy".

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Add new paragraphs 4.7.11.1 thru 4.7.11.1.5:

"4.7.11.1 Sixty day localized corrosion test.

"4.7.11.1.1 Corrosive medium. The medium used shall be the concentrate under test.

"4.7.11.1.2 Apparatus. The apparatus used shall be a laboratory grade 600 ml Pyrex beaker containing glass beads, with loose-fitting cover.

"4.7.11.1.3 Test specimen. The size and shape of the 304 stainless steel specimens shall be sheared strip material measuring approximately 1/16 by 1 by 3 inches. After being sheared and degreased in acetone, the specimens shall be immersed in a 1:9 concentrated nitric acid:water solution (10 percent HNO_3) for 5 minutes to remove metallic contamination. They shall then be rinsed well with distilled water and air dried. As a rule, the larger the number of specimens tested in a particular medium the more reliable the corrosion test. Ten shall be the minimum number of specimens per medium.

"4.7.11.1.4 Procedure. Each specimen shall be girdled lengthwise with a clean 1/16 to 1/8 inch wide band of a good grade of gum rubber of a size such that the band is taut during the test. Because of the poor quality of most commercial rubber bands, it is recommended that the bands for this test be cut from 1-3/4-inch flat width pure gum amber tubing, Gooch type (Preiser Scientific Rubber tubing, Pure Gum, Gooch Type, 1/32-inch thin wall, pure gum amber tubing, very elastic, especially made for Gooch crucibles, Stock No. 139080 or equal). This tubing is most easily cut into uniform strips with a blade-type papercutter, but can also be cut with sharp shears. The specimens with their rubber bands shall be placed in a beaker so that no contact is made between individual specimens. A 1/4-inch layer of glass beads shall be introduced into the beaker to aid in stabilizing specimen position. Enough liquid shall be added to completely immerse the specimens, and a watch glass shall be placed over the beaker to retard evaporation (but allow air access) and act as a dust cover.

"4.7.11.1.5 Results. The specimens shall be monitored daily over a 60-day period to ascertain the presence or absence of pitting. These daily examinations shall be made without disturbing the test (other than removing the cover). Corrosion is customarily signaled by the appearance of a dark spot which, if removed after sufficient exposure, discloses a corrosion pit. If the suspected area cannot be positively identified by the naked eye, it can be at a magnification of 10X. At the end of the test, each specimen shall be inspected carefully with particular attention being given to the edges of the specimens and those areas of the specimens under, or adjacent to the rubber bands. 10X magnification shall be used, if necessary."

4.7.12: In line 1, delete "Three samples" and substitute "One sample"; in line 3, delete "135°" and substitute "150°"; and in line 4 delete "Additional samples" and substitute "An additional sample".

4.7.12.1, first sentence: Delete and substitute "At the end of the exposure period, the concentrate samples shall show no evidence of stratification. Any precipitate, if present, shall not exceed 1 percent by volume."

Add new paragraphs 4.7.13 and 4.7.14:

"4.7.13 Chloride content. The chloride content shall be determined as specified in ASTM D1821-63, except for the following modifications:

(a) The procedures shall be modified as follows:
  (1) Weigh 4.0 + 0.1 grams of concentrate into a clean 250 ml beaker.
  (2) Add 150 ml of acetone measured by graduated cylinder. Add 4 ml of dilute nitric acid (1 volume concentrated nitric acid to 60 volumes of water).

(b) The calculation shall be modified as follows: Chloride content, ppm = 44.4 (A - B).

"4.7.14 Potassium dry chemical compatibility. The dry chemical compatibility test shall be conducted in the same manner as the 28 ft^2 fire test specified in 4.7.8, except that before ignition, 20 pounds of potassium dry chemical fire extinguishing agent conforming to MIL-F-22287 shall be evenly distributed over the entire 28 ft^2 area by means of sifting through an 8-inch diameter, 40 mesh standard sieve conforming to type I, style A of RR-S-366. The sieve may be attached to a handle to facilitate distribution of the powder."

Section 5: Delete and substitute:

"5. PREPARATION FOR DELIVERY

"(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in Section 2, see 6.4.)

"5.1 Preservation packaging. Preservation packaging for levels A and C shall be as specified hereinafter.

"5.1.1 The AFFF liquid concentrate shall be furnished in a 5-gallon plastic or in a 55-gallon composite container as specified (see 6.2).

"5.1.1.1 Five-gallon plastic container. The container shall be of one-piece molded polyethylene as specified herein. The container shall be as follows:

Capacity	5-gallon (min.)
Height, body (overall)	14-1/4 inches (approximate)
Diameter, body (overall)	11 inches (approximate)
Pour opening (inside dia.)	1-1/2 inches (min.)

"5.1.1.1.1 The container shall meet the requirements of Department of Transportation Specification Number 34. Containers shall be:

(a) Stackable and self-supporting.
(b) Provided with a tamperproof lock or seal and an NPT threaded-type plastic cap fitted with a gasket for the pour opening.
(c) May be provided with a vent opening having an easily punctured membrane. When furnished, vent opening shall be provided with an NPT threaded-type plastic cap.
(d) An integrally molded recessed handle.
(e) A blue color conforming to 5.1.1.3. In addition to the blue color, containers shall be marked with a 1-inch-wide white band, extending around the entire circumference of the container. The center of this band shall be placed a minimum distance of 1-1/2 inches from the end of the container (top or bottom) and be positioned so that no other identifying marking is obscured. The band may be marked at the time of container manufacture using the techniques involved in applying other identifying marking.

"5.1.1.2 Fifty-five gallon container. The 55-gallon container shall be a composite comprised of a plastic insert and a steel drum overpack. The composite container shall conform to the requirements of type II, class 4 of PPP-C-1337, and the following:

(a) Insert. The insert shall contain two protruding openings in the top head - one 3/4-inch and one 2-inch. Openings shall be so designed that when positioned in the steel drum cover there will be no strain on the protruding openings. The protruding plastic openings shall be secured to the drum cover by means of lock or retaining rings and gaskets. Openings shall be closed by use of NPT threaded plastic plugs and gaskets.
(b) Covers. The steel drum cover shall be provided with two openings to accommodate the protruding insert openings. Covers shall be fully removable and provided with gaskets. Covers shall be secured to the steel drum with minimum 16 gage bolt or lever lock type locking rings.

"5.1.1.3 Exterior color and coatings. Color shall be blue and shall be an approximate match to color number 15123 of Federal Standard 595. Exterior coating for fiber and steel drum overpacks shall conform to TT-E-489. In case of question or dispute, a color chip shall be submitted to NAVSEC for resolution. In addition to the blue color, containers shall be marked with a 1-inch wide white band, extending around the entire circumference of the container. The center of this band shall be placed a minimum distance of 1-1/2 inches from the end of the container (top or bottom) and be positioned so that no other identifying marking is obscured. The band may be marked at the time of container manufacture using the techniques involved in applying other identifying marking.

"5.2 Packing. For levels A, B, and C, no further packing is required.

"5.2.1 Method of shipment shall comply with Uniform Freight Classification Rules or other carrier rules as applicable to the mode of transportation.

"5.2.2 Palletization. When specified (see 6.2), 5-gallon plastic containers shall be palletized for shipment in accordance with MIL-STD-147.

"5.3 Marking. In addition to the marking specified in 3.14 and any special marking required (see 6.2), containers and palletized unit loads shall be marked in accordance with MIL-STD-129."

6.2: Delete and substitute:

"6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Size of container required (see 5.1.1).
(c) Whether palletizing is required (see 5.2.2).
(d) Special marking required (see 5.3)."

Review activity:
AS
User activities:
YD, MC

Preparing activity:
Navy - SH
(Project 4210-N112)